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UNIVERSITY EXTENSION[1]

THE circumstances under which university extension was introduced in this country and the early history of the movement are so familiar that time should be devoted to little more than a brief survey of the main facts.

The great popular educational factors in the United States previous to 1890 were the American National Lyceum founded in 1831 and Chautauqua, with its summer schools and Literary and Scientific Circle, started in 1874. Both of these societies, though quite independent of direct university affiliation, embraced many features that belong to university extension.

University influences were widely diffused through the Lyceum lecture courses, which included among their contributors such men as Daniel Webster, Emerson, Horace Mann, Wendell Phillips, and others of wide renown.

The true principle of educational extension underlay the establishment of the Lowell Institute of Boston and the Peabody Institute of Baltimore, both representatives of the early Lyceum. The debating-club, earnestly fostered by university extension to-day, began with the Lyceum, and the traveling library, so essential an adjunct to extension teaching, was first proposed in this country in 1831 when a portion of money was set aside by the Lyceum for what was termed "itinerating libraries."

Mr. Herbert B. Adams, in the *Report of the United States Bureau of Education*

[1] From a paper presented on behalf of the University of Wisconsin by Professor Louis E. Reber at the eleventh annual conference of the Association of American Universities.

for 1900, ascribes the establishment and spread of those summer assemblies, which were the forerunners of the summer schools of Harvard, Virginia, Wisconsin, and many other state universities, to the influence of the old Lyceum and says further, "It is no secret that the summer schools of Oxford and Cambridge were suggested by American experience."

Correspondence-study, a method of popular education which has in the past decade become an increasingly important feature of university extension teaching, was used in Chautauqua teaching as early as 1878. It is interesting to note in passing that this method under the title "Printed Lectures" was used in England in 1887, nine years later than its introduction by Chautauqua. These lectures are sent to remote and isolated students and were accompanied by lists of searching and suggestive questions similar to those which form an important feature of the more modern correspondence-study.

Chautauqua, like the Lyceum, has been useful in spreading university influences. Its summer schools are conducted chiefly by college professors, who for many years continued the instruction throughout the year by correspondence. At one time it was possible for the Chautauqua student to aspire by this means even to a college degree, the power of its granting being vested in the University of the State of New York. This privilege was withdrawn, however, when other means for home study became more generally available.

The English system of university extension was first fully presented to an American audience by Professor Herbert B. Adams, of Johns Hopkins University, who delivered an address upon this subject at a regular meeting of the American Library Association in September, 1887. Mr. Adams's address awakened prompt and fruitful interest among those who were gathered at this conference, and an immediate result was the introduction of some extension work under the auspices of public libraries in Buffalo, Chicago and St. Louis.

Four months later, in January, 1888, Mr. Melvil Dewey, then librarian of Columbia University, addressed the regents of the University of the State of New York, and in July of the same year and again one year later, university convocations, advocating the introduction of university extension teaching in connection with the public library work of New York. In 1890 a committee of New York colleges and universities urged the regents of the University of the State of New York to introduce university extension as a part of the state university system of education.

In the same year, 1890, Philadelphia organized the American Society for the Extension of University Teaching and sent Mr. George Henderson, its first secretary, to England to study methods. This society was and is quite independent of university patronage, being supported by private contributions. Upon Mr. Henderson's return from England one center was organized and in the course of the following six months no less than twenty-three were under way.

The spring of 1891 brought the first state appropriation for the organization of university extension. This was in the state of New York and the sum appropriated was $10,000 to be used for organization, printing and supervision. Mr. Dewey's report to the regents of the university remarks:

> The university extension law met with opposition from the legislature till the clause was added providing that in working out a system in which one great essential was lectures, no money should be paid to lecturers. Thus the opponents were willing to have the play of Hamlet if the Prince

of Denmark could be excluded by state law. Fortunately [continues Mr. Dewey] there was no prejudice against public libraries, and we took the line of least resistance and spent our time and money in building up libraries and developing our splendid system of traveling libraries and collections. The language of the appropriation allowed us to develop study clubs, to do some general administrative work and print syllabi for occasional extension courses throughout the state, but we had no *funds for the two most essential elements, competent organizers and experienced lecturers.*

This quotation has been given at length to show how little, in fact, that first appropriation meant in the establishment of actual university extension teaching. This work was entered in the Bulletins of the university under the caption of "Home Education" and included extension teaching, study clubs, exchanges, traveling libraries, public libraries and the library school.

Early in 1891 a society for the extension of university teaching was organized in Chicago with Professor Zueblin as its secretary, but in 1892, extension having become an organic part of the educational system of the University of Chicago, the original society was disbanded.

In December of the year which had seen so much activity in the state of New York, in Chicago, and in Philadelphia, a national congress in the interest of university extension was called at Philadelphia. It is recorded in the annals of this meeting that in the four years intervening between Mr. Adams's address in 1887 and this date, December, 1891, twenty-eight states and territories had organized university extension work. The enthusiasm of those who attended the conference was unbounded. The new cause, too young to have been fully tried, too sanguine to admit its limitations, seemed to be all silver lining. Mr. Moulton's vision of "university education for the whole nation, organized upon itinerant lines," had seized the imagination with a completeness that precluded recognition of unfavorable possibilities. Mr. Dewey, though so earnest an advocate of the movement, alone we are told sounded a note of caution, predicting the cooling that would follow upon the sudden blaze of this new flame, before the strong heat of a steady fire could be secured. In the following four or five years the truth of Mr. Dewey's prevision was amply substantiated, the work having been practically abandoned by a large number of universities whose adoption of it had been overhasty.

The more firmly established branches of university extension remained and steadily enlarged their usefulness, and in the following years new societies were founded to an extent worthy of note. But the wave of enthusiasm had passed, and the country was ready to look the matter squarely in the face, determine the adaptability of this transplanted system to American conditions, and solve the problem in accordance with its application to American needs.

In the *Atlantic Monthly* of March, 1892, an article was published by Professor George Herbert Palmer, entitled "Doubts about University Extension." This article has been quoted repeatedly in publications relating to university extension. Mr. Palmer's argument is to the effect that university extension in England "accompanies a general democratic upheaval of an aristocratic nation; it springs up in the neighborhood of universities where the common people do not resort; in its country other facilities for enabling man to capture knowledge are not yet general." He calls attention to the fact that England is a compact and thickly settled country, easy of access in every part, lending itself more readily than our vast areas to extension methods. Thus Mr. Palmer points to

fundamental differences between the two countries, and questions whether the English system of university extension can be made to thrive in our more democratic soil.

Grave doubts are expressed as to the permanent response which our people will make to the education offered, and attention is called to the difficulty of securing a sufficient number of suitable itinerant lecturers and teachers, as an insurmountable barrier. This article further cautions against the serious danger of superficiality, of cheapening, and a tendency to educational insincerity as a result of the new methods.

During the years succeeding the earliest experiments in university extension in this country, Mr. Palmer was not alone in his questioning. Many conservative views were set forth. The aristocracy of scholarship made its scornful comment in agreement with Miss Repplier's pithy summing-up of the method as offering "the second-rate at second-hand." Nor was the number small of those who echoed the voice of the Cambridge commissioners who saw need for all their resources within the walls of the university.

Publications during a period covering from ten to fifteen years expressed the general belief that university extension in the United States was practically dead. Even its most loyal friends saw that it was not accomplishing all that they had hoped. "It failed because it did not meet a popular demand," wrote one; "It has not created so large a body of serious students as was expected"; "University extension has fallen into channels of popular appeal," came from others.

It had become evident that though university extension teaching as borrowed from England was successful in several populous areas, yet, in order to become coextensive with the nation, it must adopt new methods to fit new conditions.

The recognition of this fact heralded a new era for university extension and for some years past the work has been making its own response to doubters.

The fundamental differences between England and America pointed out by Mr. Palmer doubtless exist, yet those experiences of England which have led to recent modifications of method in order to bring about a closer affiliation between university and working classes would seem to imply that "the people" there are not dissimilar to "the people" here.

There has been some reason, no doubt, for the fear that extension teaching will be more or less superficial, but I believe that there is now general acceptance of the principle enunciated by Mr. Moulton, that "as dealing with people who work for the most part under difficulties," the method must be "*more rigorously thorough and not less,*" than that of other agencies. It is recognized, also, that in comparing nonresident with resident students it is common experience to find in the former a strength of purpose and earnestness, greatly to their advantage.

The problem of finding a staff of extension workers possessing the very special qualifications required of them is still a serious one. President Hadley, with reference to university extension at Yale, says:

> We made some experiments of that kind fifteen years ago, and repeated them in a little different form five or six years ago; but we felt in both cases that with conditions as they existed in this part of the country, the men who were capable of conducting such courses could obtain larger results by directing their energies into other channels.

Mr. Hadley's observation has more or less truth at the present time, but in the five or six years that have elapsed since Yale's latest experiment, university ex-

tension has undergone radical changes. The work has ceased to depend solely upon a staff of lecturers who must combine the qualities of teacher, organizer, public speaker, scholar and philanthropist. We no longer subscribe to the epigrammatic proposition of Mr. Lyman W. Powell (one-time extension secretary at the University of Wisconsin) who said of university extension, "It is not a system; it is a *man.*" Significant as is the element of truth in this terse characterization, the time has passed when it expresses the whole truth or even a large proportion of the truth. If to-day we desired to express educational extension in a single word, that word would be *University.*

One of the most widely known and gifted extension lecturers in our country wrote a year or two ago of this phase of educational development:

> Like all ideas and movements, it has fulfilled itself in unseen ways. It is no longer an occasional and accidental phase of university work; it is an organic part of it. It is no longer concerned merely or primarily with short lecture courses; for without neglecting the lecture work that appeals to general audiences, it aims to reach, like any other part of the university, a student body—the very large body of partial or non-resident students.

The words of this passage are taken from a recent report of the department of extension teaching in Columbia University. The work offered by this institution to the "partial or non-resident student body" referred to embraces courses of collegiate grade; professional and technical courses for teachers; evening technical and evening commercial courses; and short lecture courses. The instruction is carried on in late afternoons, evenings and Saturdays at the university buildings, at Teachers College, Morningside Heights and at other places where local centers may be established. These courses are intended to give to men and women who can spend only a portion of their time in study an opportunity to gain a liberal general education or one applicable to their vocations, and to make progress if they so desire toward an academic degree, or a teacher's diploma.

Courses of university grade may be taken for credit or not as desired. If for credit, the applicant must fulfil all conditions for entrance to the university. If credit is not desired, no further qualification is required than the ability to satisfy the instructor that the course can be taken to advantage.

Of those students who were engaged in extramural courses last year, 1,206 took credit work and 11,719 non-credit work. Those who took credit work in extension courses in the university buildings numbered 2,032. Of these 224 matriculated. Credit work was carried on at seven centers in and about New York City and included twenty courses with a total of 615 lectures. Non-credit work was carried on in fifteen centers.

What more striking example can be shown of the present tendency to utilize the machinery of a great institution for a much larger student body than that qualified, by educational attainments and other conditions, to matriculate?

In preparation for a report of the status of university extension at the present time, inquiries were sent to 75 universities, colleges and other agencies for extension teaching. Responses were received from 65 institutions and of these, 54 reported participation in extension work of some form.

It is to be regretted that the limits of this paper do not admit of detailed descriptions of the growth and present magnitude of agricultural university extension. It would be necessary, in order to give

even a hasty review of its institutes, demonstrations, short courses, traveling schools and general activities, to present a chronicle of equal or greater length than this. Such a paper should be of compelling interest. The pioneers who first broke away from tradition went among the children of the soil bearing a message of improved conditions of work, of richer harvests, and of happier lives. Mr. Hamilton, of the Agricultural Department in Washington, is preparing a bulletin on the present status of this work which will be published, I believe, in the course of a few weeks.

Description must be omitted, also, of a very large number of extension agencies, such as the People's University Extension Society of New York, with its splendid philanthropies, and the free lecture courses offered in our leading cities, among which those of the New York Department of Education, so ably conducted by Dr. Leipziger, are preeminent.

Responses to inquiries show two important facts: first, a growing tendency on the part of institutions of higher learning toward extension of their usefulness to persons who are not candidates for a degree or who do not have the educational qualifications to matriculate in the university, and second, that in newer developments of extension teaching the formal lecture method has yielded, in a large measure, to other educational forms. Among these, correspondence-study has become increasingly prominent, especially for students remote from cities or large towns. Also, as a means of additional education for teachers and other seasonal workers, a rapid expansion and increase in the number of summer schools has taken place. And in the larger cities, late afternoon, evening and Saturday classes at local centers have become a valuable extension agency for vocational or general training.

The experience of the University of Chicago with respect to the original form of university extension teaching, namely, by means of lecture courses accompanied by classes, written papers and examinations, has been somewhat exceptional. Its work extends over nearly half the continent, covering 28 states, thus demonstrating that large distances do not necessarily present insurmountable difficulties. In 1907–8 the total attendance at lectures reached 53,141 persons, the average attendance per lecture was 282, and the average class attendance, 150. In 1908–9 a drop was experienced in the lecture audience to 31,094, but this was directly traceable to the loss of four popular lecturers, Professors Zueblin, Sparks, Howerth and Willett, whose places were not filled. Chicago has been successful, also, in correspondence-study teaching, her record for this year showing an aggregate of 2,500 active students.

Mention has been made of classes offered in other than work hours by Columbia University. Brown University also gives night lectures, for credit or not as those who take the work desire. Tulane, Chicago, Pittsburgh, Northwestern and Cincinnati universities are doing similar work. In every case, I believe the only condition imposed upon those students who do not desire credit is that they shall satisfy the instructor that they can take the work to advantage. Harvard offers this year in Boston three evening courses for credit in freshman and sophomore studies through the Lowell Institute. Two universities recently organized, Toledo and Newark, are providing in their foundation for extension teaching at other than workers' hours. Toledo, indeed, like Exeter, Colchester and Reading in England, is the

direct outgrowth of a university extension center.

Of 32 *state* universities and colleges reported, 23 are offering general extension work. Of these, 15 have thoroughly organized, comprehensive extension departments under the permanent direction of a dean, director or extension committee (universities of California, Colorado, Florida, Georgia, Indiana, Iowa, Kansas, Minnesota, Missouri, Montana, Nebraska, North Dakota, Nevada, Oklahoma, Oregon, Tennessee, Texas, Utah, Washington, Wisconsin, Wyoming, Pennsylvania State College and Rhode Island State College).

With reference to credit work offered by means of extension courses, returns show at least 22 universities in this classification (Brown, Chicago, Cincinnati, Colorado, Columbia, Florida, Harvard, Indiana, Iowa, Kansas, Minnesota, Missouri, Nebraska, Northwestern, Oregon, Pittsburgh, Texas, Toledo, Tulane, Washington —at St. Louis—Wisconsin and Wyoming). Of these, 11 use correspondence-study in their extension teaching (Chicago, Florida, Indiana, Kansas, Minnesota, Nebraska, Oregon, Texas, Washington, Wisconsin and Wyoming).

It is noticeable that a number of state institutions are making use of extension methods chiefly as an aid to the teachers of the state. This limited field probably results from three causes: first, the evident need of some agency to assist the busy teacher to keep in touch with educational advances; second, the fact that this is the path of least resistance, extension work among teachers offering no difficult problems, and, third, on account of the organic relations between the teacher and the state university, which are evidently becoming more closely knit, in spite of the high-school protest against university domination.

The sums devoted by state institutions to extension teaching during the past years have varied greatly. In a number of these institutions the work is either of recent origin or newly reorganized. Not a few of the responses from heads of state universities record the intention to ask for specific appropriations at the next legislative session.

Except in a few cases extension work has not been self-supporting and, unless conducted under the most favorable conditions as to location, it cannot be made self-supporting. Nor does there seem to be a logical reason why this form of education should be less freely acknowledged as a public charge than the old established institutions of our educational system. Its immense possibilities for economic and cultural usefulness to the whole people, its need for state support to insure a permanent existence, and the fact that the equipment of established institutions should be made available for its use, all point to the wisdom of making university extension an organic part of the state system of education.

Conclusions drawn from the data collected point to a notable broadening and liberalizing of the academic spirit. The fact that there are those among the old conservative universities now offering extension teaching with no more stringent specification than that the applicant shall be able to show that he can take the work to advantage, is evidence of a remarkable change in their educational atmosphere.

In the state universities a similar spirit is manifested, but in a greater variety of ways. The state university recognizes a responsibility to a more definite constituency—the people of the state who support it. That this constituency shall be served by the university in every way in which the university is the best instrument to

render the service, is a part of the new educational creed. This conception of the responsibility of state institutions has led to an especially wide-reaching organization for extension teaching in certain states, notably Wisconsin, Nebraska, Texas, Minnesota and some others.

It has been seen that the principles underlying university extension are as old as the oldest educational institutions and that many features of the work in its present development are merely adaptations of forms introduced in the past. A superficial view of these facts may provoke some degree of discouragement in the believer in university extension as a permanent partial solution of the American problem of further education for the masses. It is my desire to point out wherein modifications in the present forms would seem to promise remedies for the defects of earlier experiments and why, therefore, we may believe that in America as in England, new applications of tried methods will succeed where old ones were ineffective.

THE BOTANICAL CONGRESS AT BRUSSELS

The third International Botanical Congress was held at Brussels, Belgium, May 14–22, 1910. Saturday, the fourteenth, was the day for registration. On Sunday, the fifteenth, the members of the congress assisted at a session of the Royal Botanical Society of Belgium, held in the "dome" of the large building connected with the Jardin Botanique, at which several interesting papers were presented by members of the society. Two general sessions of the congress were held in the same room; the opening session Monday morning, the sixteenth, and the closing on Sunday, the twenty-second. No regular sessions of the congress were held in the evening, but during the week several interesting papers on phytogeographical subjects, economic botany, etc., were given in the evening.

Of the three sections into which the congress was divided for the special work of the week, perhaps the most important was the "Section on Nomenclature." The meetings of this section were held on the exposition grounds in Festival Hall.

As is well known, the Vienna Congress in 1905 selected Linnæus's "Species Plantarum," 1753, as the starting point for the nomenclature of the seed plants (Spermatophytes) and vascular cryptogams (Pteridophytes). It also established the general principles and codified the rules which form the *rules of nomenclature for plants.* In dealing with the "cellular cryptogams" certain problems were presented which the Vienna Congress decided should have special consideration, viz., the question of different, later starting points for the nomenclature of different groups of the "cellular cryptogams," and the problems connected with the nomenclature of the fungi possessing a pleomorphic life cycle.

As to the starting point for the nomenclature of plants it is well known that there were two opinions, as follows:

1. That there should be a single date recognized for the beginning of the nomenclature of all plants. This opinion was based on the principle of uniformity in time or date as the starting point.

2. That there might be several different (multiple) dates or starting points for the nomenclature of different groups. This opinion was based on the principle that *uniformity in the selection of the earliest comprehensive work treating a group, large or small, in a somewhat modern sense,* was of more importance than the principle of uniformity of date. Therefore, the Vienna Congress wisely decided to refer the consideration of the nomenclature of the "cellular cryptogams" to the Brussels Congress in 1910 in order that these problems might be studied in the meantime.

Since it will be several months before the complete proceedings of the Brussels Congress can be published, we present here, for the benefit of American botanists, a brief statement of the most important legislation enacted by the Section on Nomenclature.

On Tuesday the section began the consideration of the motions relating to the nomenclature of the "cellular cryptogams," and, with the exception of Thursday, which was devoted wholly to excursions, the work, together with the motions relating to paleobotany and phytogeography, was continued throughout the week. The different groups were taken up in the order in which they were presented in the preliminary publication, including the various motions, the result of the preliminary voting by the special commissions, the comments of the rapporteur général, and the provisional drafts of rules. In general session of the section it was voted to postpone the consideration of the bacteria diatoms and flagellates, and to take "Linnæus's Species Plantarum," 1753, as the starting point for the nomenclature of the Myxomycetes.

At the opening of the session after the noon recess it was suggested that an adjournment of the session be taken for an hour in order to allow all the specialists in the different groups of cryptogams who were present to hold informal conferences for the purpose of agreeing upon recommendations as to dates for the starting points of nomenclature which would be acceptable to them. These recommendations were presented to the section on Tuesday afternoon and Wednesday morning, and were adopted as rules without further discussion, no one expressing a desire to discuss them in general session. The majorities[1] in favor of the different votes were very large, in the case of fungi for instance 130 to 4. The dates adopted, therefore, by the Brussels Congress for the starting points for the nomenclature of the "cellular cryptogams" are as follows:

MYXOMYCETES

Linnæus, Spec. Plant., 1753.

[1] The voting on these questions was taken by a count of the number of votes to which each delegate was entitled and the number of votes cast was therefore larger than the actual number of delegates present. On certain general questions the voting proceeded by simply a show of hands.

FUNGI

Fries, Syst. Myc. 1821–1832, except for the Uredinales, Ustilaginales and Gasteromycetes, which date from Persoon's Synopsis, 1801.

LICHENS

Linnæus, Spec. Plant., 1753.

ALGÆ

Gomont, Nostocaceæ homocysteæ, 1892–1893.
Bornet & Flahault, Nostocaceæ heterocysteæ, 1886–1888.
Ralfs, British Desmidiaceæ, 1848.
Hirn, Œdogoniaceæ, 1900.
Linnæus, Spec. Plant., 1753, for all other algæ except the Chroöcoccaceæ.

BRYOPHYTES

Hedwig, Spec. Musc., 1801–1830, for the Mosses.
Linnæus, Spec. Plant., 1753, for the Liverworts.

The general position taken by the congress is well shown in the case of Bryophytes in which the fundamental species Muscorum of Hedwig was adopted for mosses while for liverworts on which there exists no work corresponding to the species Muscorum it was decided to go back to Linnæus.

Action upon the Chroöcoccaceæ, Bacteria, Diatoms and Flagellates was postponed for future discussion, partly for the reason that it was difficult to select satisfactory works to serve as a basis of nomenclature and partly because those groups have been studied also by zoologists and it is therefore necessary to take into consideration zoological as well as botanical treatises.

With regard to the nomenclature of the imperfect fungi the following rule was adopted:

Fungi with pleomorphic life cycle.

1. The different successive stages of the fungi with pleomorphic life cycle (anamorphoses, status) can bear only a single generic and specific name (binome); that is to say, the oldest, from the starting point of the nomenclature of the fungi, which has been

applied to the perfect stage, provided that in other respects it conforms to the rules.

2. For the purposes of nomenclature it is agreed that the perfect stage of fungi with pleomorphic life cycle is that which bears the ascus in the Ascomycetes, the basidium in the Basidiomycetes, the teleutospore in the Uredinales and the spore in the Ustilaginales.

3. Generic or specific names applied to imperfect stages may not be used to replace a name applied to one or more species, any one of which contains the perfect stage. *Rule.*

Citations of pre-Friesian or pre-Persoonian names follow the rule. Examples, *Boletus edulis* Fries, not *B. edulis* Bull.; *Polyporus ovinus* Fries, not *P. ovinus* (Schaeff.) Fries. Writers who prefer, however, may write *Boletus edulis* Fries ex. Bull., *Polyporus ovinus* Fries ex. Schaeff., etc.

It is recommended in case of biological species (formes speciales) among the rusts that authors who prefer to employ double names take them from the names of the host plants. A recommendation which was offered as applying to the fungi, that when a new genus is published, if there are more than one species the author should cite one as the type species, or if but one species, that one is to be regarded as the type of the genus, was adopted as a recommendation and made to apply to all plants.

On one point, viz., the desirability of having extensive lists of genera conservanda, the expression of the opinion of those present was so strong that it was practically unanimous and commissions were appointed to prepare lists of genera conservanda in the fungi, lichens, algæ, mosses and liverworts.

The following action was taken in regard to the genera conservanda in the pteridophytes and additional ones in the spermatophytes presented for consideration at Brussels. *Selaginella* was placed among the genera conservanda, while the remaining genera in the proposed list of pteridophytes were rejected.

A commission, which had been appointed for the purpose in advance of the congress, carefully considered the additional genera conservanda among the spermatophytes in the list proposed by Janchen, and recommended that 21 or 22 names be stricken out. The list, as amended, with the addition of the name *Welwitschia,* was adopted.

The motion to amend the Vienna rules by striking out the clause requiring a Latin diagnosis of new genera and species was voted down Monday afternoon along with several other motions of a general nature. The question was discussed, however, at a later time when considering a motion by the paleobotanists to the effect that a diagnosis be required only in one of the following languages: French, English, German or Italian. This discussion broadened into a general one, and although it was defeated the discussion showed that there was a strong sentiment against the Latin requirement, especially on the part of the American botanists, and the subject will probably be brought up again for discussion at the next congress.

With reference to the question of nomenclature in phytogeography the following principles were adopted:

1. Nomenclature is to be avoided and the expression *terminology* is rather to be employed.

2. When technical words are employed a clear definition of them should be given in the sense in which the writer uses them, and also when a term is used in a sense different from that in which it has formerly been employed.

3. It is recommended to use terms taken from living (vulgar) languages to denote associations, etc., and reserve expressions of Greek or Latin origin for higher units where there are rarely equivalents in the living tongues (examples, mesophytic, hydrophytic, etc.).

4. The principle of priority has no legal value in phytography. Terminology is very different from nomenclature, and must be subject to change in order to bring it in harmony with the change of ideas in the interpretation of facts.

5. A recommendation for the establishment of clear phytogeographical maps was adopted.

6. Definition of ecology: phytogeographical

ecology is the study of plants and plant associations in their relations with the medium (surrounding medium, or environmental conditions).

7. Without giving a definition of the following words, *formation* and *association,* the section recommends the use of "formation" in a wider ecological sense, and "association" in a more restricted, floristic sense. Examples: meadow, prairie, etc., are "formations"; but an alpine meadow on granitic soil in central Switzerland would be an "association."

8. *The decision to publish a dictionary of phytogeographic terminology* containing all the pertinent expressions used in phytogeographic and floristic works with original definitions and bibliographical references, and their equivalents in English, French and German.

9. It is proposed that where such words as *zone* and *region* are used in different senses in different countries to employ new and clear expressions. Examples: étage (level, or floor) = Höherenregion, Tieferenregion of the Germans = Zone altière zone abyssale of the French.

10. A commission was named for the above purpose consisting of the members of the present commission with many others added, giving the committee power to add still others.

In the publication of the proceedings of the congress the rules and recommendations adopted at Brussels will be incorporated in their proper place with those adopted at Vienna, the latter being reprinted, so that the rules of nomenclature for plants will be presented in a single and convenient brochure.

The members of the commission on the nomenclature of the cryptogams are greatly indebted to Dr. Briquet for summarizing in a comprehensive manner the many different and often conflicting views expressed by the specialists of the commission in their preliminary correspondence. Dr. Briquet also rendered a most important service in interpreting the remarks made by different speakers in French, English and German so that they were understood by all those present. Professor Flahault, Professor Mangin and Professor Engler, who presided over the different sessions, performed their duties in such a way as to deserve the hearty thanks of all the members, combining a courteous and affable manner with a strictly business management.

W. G. FARLOW
GEO. F. ATKINSON

PARIS,
May 28, 1910

PRESENTATION TO PROFESSOR BOLZA

WHEN it became generally known that Professor Bolza was to leave the University of Chicago and return to Germany, a movement was inagurated among his former students to present to him some suitable memorial indicative of their sorrow at his loss and their affection for him as a friend and teacher. The response was spontaneous and generous, making it possible to procure a beautiful and costly loving cup, which was presented to Professor Bolza at a dinner held in his honor on Friday, June 11, 1910, at the University Club of Chicago, where were gathered the members of the faculty in the departments of mathematics, astronomy and physics, together with Professor I. U. Nef, Dean Rollin T. Salisbury and President Harry Pratt Judson, representing the University of Chicago, and Dean Thomas F. Holgate, of Northwestern University, representing the American Mathematical Society.

After appropriate addresses by President Judson, Professor Moore and Dean Holgate relative to Professor Bolza's brilliant service at the university since its organization, the student committee represented by Dr. Arnold Dresden, of the University of Wisconsin, in a most touching tribute to Professor Bolza, presented to him the loving cup. Along with the cup was given a beautifully illuminated and bound dedicatory statement with the names of more than one hundred masters, fellows, doctors and other advanced students, including eight present members of the university faculty and representing twenty-six different states and as many colleges and universities in which they are now located.

Professor Bolza was deeply moved by this presentation and responded in terms indicating his genuine personal interest in his students and his gratitude and joy at such manifestation of their regard for him. He then gave an account of his university career in Germany and of his migration to this country and of his pleasant experiences at Johns Hopkins University, at Clark University and at the University of Chicago, attributing the making of his career to the unusual opportunities offered in America.

Following is the quotation from the presentation album:

To Dr. Oskar Bolza, for eighteen years professor of mathematics in the University of Chicago, a number of his former students whose names are written below, desiring to express in some tangible way their love and esteem, present herewith this loving cup.

While recognizing the inadequacy of such a method of expressing to him their feelings of loss and deep regret at his departure from the University of Chicago and from this his adopted country, they hope that the graceful curves of this loving cup and the luster of its pure metal, may serve to remind him and Mrs. Bolza, as they look upon it in years to come, of their host of loving and loyal friends in America.

Those among the students of Professor Bolza who have known him best are foremost in their appreciation of his unusual qualities as both a lecturer and in awakening the spirit of research. Faithful in precept and inspiring in example, he has been a tower of strength at the university for nearly two decades, while students by the hundreds, after drawing from him mathematical inspiration and power, have gone forth to all parts of this country, many of them to occupy positions of responsibility and trust in our leading colleges and universities.

As a genial friend whose hospitality we have all enjoyed, as an inspiring teacher whose peer we have seldom known, as a contributor to mathematical science whose reputation is established both here and abroad, as the man who with Professors Moore and Maschke made the University of Chicago from its earliest days one of the foremost of mathematical schools, we pay respectful tribute to Professor Bolza, and wish him and Mrs. Bolza the widest usefulness and the greatest happiness in their new "old home" in Freiburg.

It was announced by President Judson that the trustees had refused to erase Professor Bolza's name from the roll of the faculty, but instead made him non-resident professor of mathematics, thus strengthening the hope that from time to time he may return for a quarter's residence at the university.

Professor and Mrs. Bolza sailed for Germany during the last week of June.

H. E. S.

SCIENTIFIC NOTES AND NEWS

Sir William Crookes has received from the British government the order of merit, filling the place vacant by the death of Sir William Huggins.

Dr. J. Mark Baldwin has been elected a corresponding member of the French Academy of Moral and Political Sciences, to fill the place vacant by the advancement of Professor William James to be foreign associate.

Professor Charles Perez, of Bordeaux, has been elected a corresponding member of the Paris Academy of Sciences, in the section of anatomy and zoology.

Sir J. J. Thomson, F.R.S., has been elected president of the Junior Institution of Engineers.

The banquet to the five past-presidents of the Chemical Society, Professor W. Odling, F.R.S., Sir Henry E. Roscoe, F.R.S., Sir William Crookes, F.R.S., Dr. Hugo Müller, F.R.S., and Dr. A. G. Vernon Harcourt, F.R.S., who have attained their jubilee as fellows of the society will take place at the Savoy Hotel, London, on November 11.

The Royal College of Physicians of Edinburgh has awarded its Cullen Victoria Jubilee prize to Dr. R. W. Philip, for his work on tuberculosis.

Mr. Zaccheus Daniel, of Princeton University, has been appointed assistant at the Allegheny Observatory, University of Pittsburgh, and Mr. R. J. McDiarmid, of the University of Toronto, has been appointed fellow in astronomy at the same institution.

Dr. Chas. S. Palmer, formerly of Colorado, now in Newtonville, Mass., has been appointed

chief consulting chemist of the Arlington Mills.

THE secretary of state for the colonies has selected Mr. Joseph Pearson, D.Sc., F.L.S., as director of the museum at Colombo, Ceylon, in succession to Dr. Arthur Willey, now appointed professor of zoology at McGill University, Montreal. Dr. Pearson's removal has created a vacancy in the zoological staff at the University of Liverpool which will be filled by the appointment of Mr. R. Douglas Laurie as senior demonstrator and assistant lecturer, while Dr. W. J. Dakin will join the staff as second demonstrator.

PROFESSOR ROBERT GANS has been appointed geologist in the Geological Bureau at Berlin.

DR. F. A. BATHER, F.R.S., will represent the British Museum of Natural History at the Stockholm International Geological Congress.

PROFESSOR R. DEC. WARD, of Harvard University, sailed for Brazil on July 20 in order to make a study of the economic climatology of the coffee region of São Paulo.

BOTANICAL field work in Mexico will be engaged in next September by a class now being organized by the department of botany at the University of Chicago. The class will be in charge of Dr. J. M. Coulter, head of the department, assisted by Assistant Professor C. J. Chamberlain and W. J. G. Land and J. G. Brown, instructors in botany.

PROFESSOR C. W. EDMUNDS, of the University of Michigan, is spending the summer at the Hygienic Laboratory, U. S. Public Health and Marine Hospital Service, Washington, doing special research work in pharmacology.

THE medical faculty of the Johns Hopkins University received during the session 1908–9 the sum of one hundred and fifty dollars from Dr. A. E. Malloch, of Hamilton, Ontario, with the request that it be awarded as a prize to the student presenting in competition the best essay upon "The Life and Work of Lister." The nine essays received were examined by a committee appointed by the faculty, who awarded the prize to Mr. Charles Chauncey Winsor Judd. The successful essay will be published in the Johns Hopkins Hospital *Bulletin*.

A SERIES of lectures on the conservation movement by several of the government experts is in progress this summer at the University of Chicago, forming part of the program of public lectures which, according to custom, are open to all who care to attend. The subjects of the addresses thus far announced are "Conservation of Mineral Resources," "Reclamation of Waste Lands" and "Conservation of Forests." Among the speakers announced are: Charles W. Hayes, chief geologist of the United States Geological Survey; Frederick H. Newell, director of the Reclamation Service, and Chief Forester Henry S. Graves.

THE death is announced of Samuel Bowdlear Green, dean of the school of forestry of the University of Minnesota, known for his publications on horticulture and forestry, at the age of fifty-one years.

GIOVANNI VIRGINIO SCHIAPARELLI, the eminent Italian astronomer, died on July 4, at the age of seventy-five years.

JOHANN GOTTFRIED GALLE, the great German astronomer, died on July 10, at the age of ninety-eight years.

DR. JULIUS WEINGARTEN, professor of mathematics at Freiburg, has died at the age of eighty-five years.

M. LOUIS RAFFY, professor of mathematics at the University of Paris, has died at the age of sixty-five years.

DR. HUGO ERDMANN, professor of chemistry in the Berlin School of Technology, has been drowned, at the age of forty-eight years.

IT is reported that the first output of radium from the Trenwith mine, St. Ives, Cornwall, has been obtained. It consists of about 24 grains of radium and is valued at $150,000.

THE next meeting of the American Ornithologists' Union will be held in Washington, D. C., beginning Monday, November 14.

A SERVIAN Geographical Society has been founded at Belgrade, with Professor J. Cvijič as the first president. It will issue a quarterly publication.

The joint summer meeting of the Institution of Mechanical Engineers and the American Society of Mechanical Engineers will take place in Birmingham and London on July 26 to 30. *Nature* states that the following papers are to be read and discussed: In Birmingham: "English Running-shed Practise," by Mr. C. W. Paget; "Engine-house Practise, or the Handling of Locomotives at Terminals to Secure Continuous Operation," by Mr. F. H. Clark; "Handling Locomotives at Terminals," by Mr. F. M. Whyte; "Handling Locomotives," by Mr. H. H. Vaughan; "American Locomotive Terminals," by Mr. W. Forsyth; "High-speed Tools, and Machines to Fit Them," by Mr. H. I. Brackenbury; "Tooth-gearing," by Mr. J. D. Steven; "Interchangeable Involute Gearing," a joint paper by members of the Committee of the A.S.M.E. on standards for involute gears. In London: "Electrification of Suburban Railways," by Mr. F. W. Carter; "Cost of Electrically-propelled Suburban Trains," by Mr. H. M. Hobart; "Economics of Railway Electrification," by Mr. W. B. Potter; "Electrification of Trunk Lines," by Mr. L. R. Pomeroy; "Electrification of Railways," by Mr. G. Westinghouse.

The program of the annual meeting of the British Medical Association has been published. The meeting will be held in the University of London and the adjacent collegiate buildings at South Kensington on July 22 and 23 and during the following week. The general meeting will open on July 22, under the presidency of Sir William Whitla, and will be adjourned until July 26, when the president-elect, Mr. H. T. Butlin, will be inducted and will deliver his address. The representative meeting will assemble in the Guildhall on July 22, 23, 25 and 26. The council meeting will be held on July 26 and July 27. On the latter date and the two days which follow the scientific business of the meeting will be conducted in 21 sections. The address in medicine will be delivered on July 27 by Dr. J. Mitchell Bruce, of London, and the address in surgery on July 28, by Mr. H. G. Barling, of Birmingham. The annual service will be held on the afternoon of July 27 in Westminster Abbey, and in the evening of that day the lord mayor and corporation will give a *conversazione* at the Guildhall. The annual dinner will take place on July 28. The sections, with their presidents, are as follows: Anesthetics, Dr. F. W. Hewitt; Anatomy, Professor Arthur Keith; Bacteriology, Dr. C. J. Martin; Dermatology, Dr. Phineas Abraham; Diseases of Children, Dr. A. E. Garrod; Gynecology and Obstetrics, Dr. Mary A. D. Scharlieb; Laryngology, Mr. Herbert Tilley; Medical Sociology, Dr. J. A. Macdonald (Taunton); Medicine, Dr. R. W. Philip (Edinburgh); Navy, Army and Ambulance, Colonel Andrew Clark; Odontology, Mr. J. H. Mummery; Ophthalmology, Mr. Charles Higgens; Otology, Dr. Edward Law; Pathology, Mr. S. G. Shattock; Pharmacology and Therapeutics; Professor A. R. Cushny; Physiology, Professor W. H. Thomson (Dublin); Psychological Medicine and Neurology, Dr. T. B. Hyslop; Radiology and Medical Electricity, Mr. J. M. Davison; State Medicine, Sir Walter Foster; Surgery, Sir Victor Horsley; Tropical Medicine, Dr. F. M. Sandwith.

We learn from *Nature* that Lord Crewe, secretary of state for the British Colonies, has appointed a committee, formed of representatives of the Colonial Office and of the Natural History Branch of the British Museum, to consider the protection of plumage-birds. The main object in view is to consider to what extent it may be practicable to prevent, either by legislation or by departmental control, the indiscriminate slaughter of such birds now prevalent in certain parts of the empire. Action of this nature can be effectual only by the cooperation of the governments of all the countries included in the British Empire, and it is hoped that this may be obtained.

A first circular concerning the tenth International Geographical Congress to be held next year in Rome has been issued by the organizing committee and is summarized in the *Geographical Journal*. The date fixed is the week from October 15 to 22, in which month it is thought that the business of the meeting can be carried on without undue

interruption from the commemoration of the proclamation of the Kingdom of Italy, with which the congress is being purposely associated. The general regulations of the congress, which are printed in the circular, follow the same broad lines as those of previous congresses. Eight sections, representing the principal branches of geography, will be constituted, and communications may be made in Italian, French, German or English. Abstracts of communications proposed for presentation to the meeting must be sent in not later than April 30, 1911, and reports on subjects brought up at previous congresses or suggested by the executive sub-committee must be received in full not later than August 31, 1911. The time allowed for the reading of communications will not exceed fifteen minutes. Delegates may be nominated by governments, public departments, societies or other institutions concerned with geography, and all votes of sections must be confirmed by the meeting of delegates. Intending members are invited to send in their names at an early date. On payment of the amount of subscription they will receive their ticket of membership, with the necessary instructions and documents. Meanwhile information as to travel, etc., can be obtained from the "Ufficio viaggi ed informazioni gratuite," 372–373, Corso Umberto I., Rome. A special program of excursions will be issued later, and a complete program of the congress will be sent to all who have enrolled themselves as members. The president of the congress is the Marquis Raffaele Cappelli, president of the Italian Geographical Society.

THE fifth meeting of the International Congress of Mathematicians, which is held every four years and met on the last occasion in Rome in 1908, will take place at Cambridge in 1912. The London *Times* states that in connection with one of the sections of the congress an International Commission on Mathematical Teaching has been constituted, which includes delegates appointed by the various governments interested in the congress, and a series of national sub-commissions has been established to assist the International Commission. The president of the Board of Education has appointed Sir George Greenhill, M.A., F.R.S., Professor W. W. Hobson, Sc.D., F.R.S. and Mr. C. Godfrey, M.A., to be the British delegates, and he has further appointed an Advisory Committee to assist the Commission in the collection of reports and papers on the teaching of mathematics, and this committee, which is to act also as the British Sub-Commission, has been constituted as follows: C. E. Ashford, Esq., M.A., Sir G. H. Darwin, F.R.S., LL.D., D.Sc., C. Godfrey, Esq., M.A., Sir George Greenhill, M.A., F.R.S., G. H. Hardy, Esq., M.A., F.R.S., Professor W. W. Hobson, Sc.D., F.R.S., C. S. Jackson, Esq., M.A., Sir Joseph Larmor, D.Sc., LL.D., F.R.S., Professor A. E. H. Love, M.A., D.Sc., Professor G. A. Gibson, LL.D., F.R.S.E. Mr. C. S. Jackson is honorary secretary to the sub-commission. Copies of the reports and papers approved by the Advisory Committee will be at the disposal of the International Commission above named, and it is intended that they shall ultimately be published as a volume or volumes in the board's series of special reports on educational subjects.

FROM the annual reports of German chemical factories Consul-General Richard Guenther notes continued high dividends and trade activity. The works at Biebrich earned $1,000,000 in 1909 (capital stock about $2,000,000), paid 32 per cent. dividends, and gave $100,000 as gratuities to directors. Several others earned large sums and paid 12 to 27 per cent., with gratuities to directors. The Farbenfabriken-Bayer Company, of Elberfeld, whose capital is $8,500,000, made a profit of over $5,000,000, declared a 24 per cent. dividend, and an extra dividend of 21 per cent. from overgrown reserve funds, which still contain $4,355,000 after the disbursement. This concern states that it has perfected an artificial rubber. The Badische Anilin and Sodafabrik Works (capital, $8,500,000) paid 24 per cent. It does an excellent business with the United States. Owing to the new British patent law it has erected works in England, and has also built extensive works in Norway for extracting nitrogen from air. It is well known that the German chemical industry is

the result of scientific research and that large numbers of trained research chemists are employed.

UNIVERSITY AND EDUCATIONAL NEWS

Professor William Trufant Foster, who holds the chair of education at Bowdoin College, has accepted the presidency of the Reed Institute, a college to be established at Portland, Oregon, through a fund given by Mrs. Amanda Reed, now amounting to about $3,000,000.

The board of regents of the University of Texas has approved the plans submitted by the faculty of the medical department for building and equipping a laboratory of preventive medicine and public health.

According to statistics of attendance at the University of Chicago for the year ending in June, 1910, which have just become available, an increase is shown over that for the preceding year, the actual figure being 6,007 students for the year 1909–10, as against 5,659 for the year 1908–9.

The London County Council has made a maintenance grant of £8,000 to the Imperial College of Science and Technology, South Kensington, and in return it secures the privilege of nominating 25 students for one year's free instruction at the college.

Mr. H. O. Allison, for a number of years connected with the department of animal husbandry of the University of Illinois in beef cattle investigations, has been elected to the position of assistant professor of animal husbandry in the University of Missouri. His special work will be the development of the breeding herds of beef cattle and the cattle feeding experiments in the experiment station.

Mr. C. M. Hilliard (Dartmouth and Massachusetts Institute of Technology) has been appointed assistant tutor in biology at the College of the City of New York.

Mr. Henry Leighton, of the New York State Museum, has been appointed instructor in mining geology in the University of Pittsburgh School of Mines.

Promotions at the Johns Hopkins University have been made as follows: Charles K. Swartz, Ph.D., collegiate professor of geology; John B. Whitehead, Ph.D., professor of applied electricity; Edward W. Berry, associate in paleobotany; Rheinart P. Cowles, Ph.D., associate in biology; Knight Dunlap, Ph.D., associate in psychology; William W. Holland, Ph.D., associate in chemistry; Carroll M. Sparrow, A.B., instructor in physics; Donald R. Hooker, M.D., associate professor of physiology; Carl Voegtlin, Ph.D., associate professor of pharmacology; George H. Whipple, M.D., associate professor of pathology; Eliot R. Clark, M.D., associate in anatomy; Herbert M. Evans, M.D., associate in anatomy; John H. King, M.D., associate in pathology; Arthur H. Koelker, Ph.D., associate in physiological chemistry; Milton C. Winternitz, M.D., associate in pathology; Charles R. Essick, M.D., instructor in anatomy; Thomas P. Sprunt, M.D., instructor in pathology.

DISCUSSION AND CORRESPONDENCE

THE PROFESSORIAL QUESTION

It seems unfortunate that so important a contribution as that of Mr. Chapman's should appear at a time when professors, on vacation bent, are trying to dismiss the professional aspects of their vocation. Yet the charge of timidity and weak concern for their closest interests, which is made with incontrovertible pertinence, is pertinent at any time. Mr. Chapman devotes his article particularly to calling attention to the unjust and unwise set of scruples that seem to stand in the way of the proper assertion of his rights on the part of the professor. I am similarly convinced that a combination of timidity and a distorted scruple is responsible for the reserve in question. Indeed, I agree so cordially with each one of the positions assumed that I find little to add except by way of enforcement of detail. In my opinion Mr. Chapman has not alone pointed out one of the most serious menaces in the educational situation, but so far as he goes, indicates correctly a few of the steps which seem promising in "unwinding this boaconstrictor" which is strangling scholars and their interests. The first step is to make it good form and a meritorious and generously commended act when a professor speaks of his

class interests, boldly, frankly, proudly; rather than have it looked upon, as it too commonly is looked upon, as a rather ill-advised expression of a personal grievance or of opposition to constituted authorities.

The natural custodians of education in any age are the learned men of the land, including the professors and schoolmasters. Now these men have, at the present time, in America no conception of their responsibility. They are docile under the rule of the promoting college president, and they have a theory of their own function which debars them from militant activity.

Mr. Chapman applies these criticisms particularly to the common situation of an injustice done to a member of the faculty, which his colleagues do not resent, against which they do not protest. All this is true and serious; but it may be regarded as but a single though common illustration of the more fundamental evil: the fact that matters of this kind are decided by college presidents and not by the faculties. In this aspect the presidents need not be specifically censured. They are personally not much to blame except as personally they aggravate a situation inherent in the nature of the position which they have helped to create. I can state the point unambiguously by using a colleague's cynical phrase: that any man who would accept a presidency and exercise the authority which it implies thereby adequately proves that he is not the right man for the place. The danger is in the office rather than in the man; for it seems unmistakable that the office changes the man. Professors become presidents and lose the academic attitude with surprising and regrettable alacrity. All this is a part of the administrative peril in education. There is entertained a totally false view of the dignity, worth and necessity of the administrative function in education; of this the president is the acute expression, and in some measure likewise the cause.

It is then the fact, regret it as we may, that the university president gets to think in administrative terms; that the professorial interests are not expressed by him or through him; that indeed in many aspects the presidential aspect and the faculty aspect of policy and measures are quite opposed. The injustice and the danger is enhanced by reason of the fact that the president is in the position of vantage and places measures before the board of trustees or regents, with whom he stands in direct relation; and thus the administrative policy is enforced and the professorial interests sacrificed. It would be foolish not to mention in the plainest words that the authority which the president exercises in the way of fixing salaries and promotions is the most serious obstacle to a removal of the ills as well as to the proper expression of protest by the professors themselves. This is one of the sources, and a most natural one, of the timidity of which the professor stands convicted.

It so happens that the same issue of SCIENCE which brings Mr. Chapman's notable contribution contains an extract from President Hadley's report in regard to the mode of fixing professors' salaries. The matter may be cited just because of the exceptionally high standing of President Hadley and his well-known sympathy with the professorial interests, and his approval of the largest democratic privilege enjoyed by any faculty—that of Yale—in participating in the elections and promotions of its own members. Yet the issue is discussed from a purely administrative point of view, the question of the benefit of the academic situation or the personal preference of the professors being wholly neglected. And in this issue I believe emphatically that the actual solutions of the salary question as an academic one and as an administrative one are quite opposed. A very large uniformity of salary, automatic promotion, a complete unwillingness to use salaries as a means of reward (or punishment by withholding advances) or as a differentiation of merit—this is the academic solution. Yet this issue it is not necessary here to discuss, only to point out that this is a question upon which the professorial and the administrative attitudes are likely to lead to opposite conclusions; that at present the danger is great, almost a certainty, that the administrative side will prevail and the professorial remain unheard, because of the timidity of the professor, and the fear of misunderstanding his motives. I

am prepared to admit that in many issues the administrative and the academic decisions will agree. In those cases I shall still regret that the right decision is reached for the wrong reasons, or that an unwise precedent is enforced by giving decisive weight to minor considerations. Everything that makes for the importance of the administrative function in the higher education is, to my thinking, bad, especially when it gains its prestige at the sacrifice of the professors' interests.

I go back but a few issues in SCIENCE to find another illustration. Vigorous protests appeared in SCIENCE and elsewhere against the summary action of the Carnegie Foundation in cutting off the privilege of retirement after twenty-five years of service, which had been definitely agreed upon as one of the two main purposes of the foundation. That this action was unwise and unethical has been made clear; and it is certainly most important that the foundation modify it at its next meeting. For the moment that is not the issue. The pertinent matter is again that in reaching this decision the academic interests were insufficiently considered. It is inconceivable that if the board of the foundation were composed, as it should be, of professors (with one or two presidents to represent the necessary administrative side of things) such an action should have been taken. It is another case of the conflict of the two interests and the unwise and unjust arrangement whereby the administrative side prevails and the professorial side is not officially represented.

I agree lastly with Mr. Chapman's contention, that as things are, the most hopeful procedure is for the professors to appeal directly to the boards of laymen who control affairs. I have every faith in the fairness of the lay boards. I believe that they have been largely misled by the over emphasis by the president of the administrative side of affairs, by the natural assumption that he was really representing faculty sentiment when he could not vitally do so. This will not be a radical measure, only a temporizing one, it is true; but it is practical. The only radical measure will be one that rearranges the authority of professor and president and minimizes in every respect the administrative function, making the administrative officers, what they should be and be satisfied to be, the convenient mode of expressing the will of the faculty and of preserving the energies of the faculty in behalf of academic purposes. I am aware that the suggestion has a danger of its own; that of inducing the board to take a hand in educational matters. In principle that is unwise, and is most subject to abuse. But the good to be gained is well worth that risk. Moreover, I believe that the good sense of lay boards will be and in the end must be the only safeguard against their unwise interference with the prerogatives of the faculty. Furthermore, the division between educational and financial questions is quite artificial and has as a fact been used to throw the authority where it is desired. Just as soon as professorial opinion makes itself felt, it will be respected. It is certainly regrettable that the situation demands this form of solution; but practically I see no other as promising. A far better solution would be the natural decline of the administrative temper in the higher education, by a refusal on the part of men elected to such positions to exercise it.

Be the solution what it may, and the temporary steps such as in each situation the best wisdom and the kindest consideration of all interests may suggest, this remains certain: that no one will respect those who do not respect themselves and stand boldly and proudly for their rights. The timidity and the unwise reserve of the professor stand as the most serious obstacle in the way of the removal of the evils in the professorial situation.

JOSEPH JASTROW

CHESTER, NOVA SCOTIA,
July 9, 1910

SCIENTIFIC BOOKS

Rara Arithmetica. A catalogue of the arithmetics written before the year MDCI. with a description of those in the library of George Arthur Plimpton, of New York. By DAVID EUGENE SMITH, of Teachers College, Columbia University. Boston and London, Ginn and Co. 1908.

As a rule, bibliographical works, though valuable, are uninteresting. The publication which we are reviewing is an exception to the general rule; it is interesting as well as valuable. Every college and school library ought to possess a copy of it. The author aims not only to catalogue the arithmetics in Mr. Plimpton's library that were published before 1601 and give a brief statement of their contents, but to supplement this by the titles of other arithmetics known to have been printed during that period. Altogether not less than 500 publications are given, a number which swells to 1,200, if the various editions of each publication are counted. In addition to this a large number of manuscripts, some belonging to the thirteenth century, are catalogued and described. Perhaps no period in the history of arithmetic is more important than the fifteenth and sixteenth centuries, when printed works came to be widely used and when different methods of reckoning were struggling for supremacy.

What makes this book specially interesting are the numerous protographs of the title-pages, and of other pages exhibiting the notation and methods of computation in arithmetic, in vogue four or five centuries ago. The reader has before him in photographic reproduction the old scratch methods of multiplication and division, the beginnings of decimal fractions, documents showing the probable origin of the + and — signs, drawings explaining various kinds of finger symbolism and many other points of interest to teachers and students of arithmetic.

In America few researches have been carried on in the history of mathematics. One needs only examine the volumes of the *Bibliotheca Mathematica,* a journal devoted to the history of mathematics, to realize the dearth of American productive scholarship in this field. With this fact in view it is a pleasure to note that the above publication is one of value and importance, when measured by European standards. Sixty years ago De Morgan's "Arithmetical Books" was the best authority on arithmetical bibliography. Later much work in this line was done on the European continent. Now Professor Smith's "Rara Arithmetica" takes first rank. Professor Smith has enjoyed unusual facilities for the preparation of this work. The Plimpton collection of fifteenth and sixteenth century arithmetics, in New York City, the largest collection of this kind that has ever been made, lay at his disposal. He has labored assiduously and with care. Here and there we might have wished to have seen a still wider range of topics selected for photographic exhibition; in one or two instances a greater watchfulness for the historically vital points in books might have been desired. But these are minor blemishes. The work as a whole takes first place as a bibliography of early printed arithmetics.

FLORIAN CAJORI

Thought and Things or Genetic Logic.[1] Vol. II., *Experimental Logic.* JAMES MARK BALDWIN. London, Swan Sonnenschien & Co.; New York, The Macmillan Company. 1908. Pp. xv + 436.

This is the second of three volumes on a subject never before so comprehensively treated by an American author. The title of the present volume has been in use for some time, but the treatment is peculiar. The genetic method of tracing out the various steps and stages in the embodiment of belief is more consistently followed here than, I think, in any well-known treatise on logic. Great praise is due the work for this and for many interesting and illuminating points in the discussion. The general problem of the work is logic from the knower's point of view, not logic from the point of view of the outside psychologist or logician who looks on and analyzes. The theme itself as conceived by Baldwin presupposes a difference between these two types of logic: it presupposes that knowledge and the knowing process have for the knower characters which they do not have for the "outsider." Knowing, for the knower, involves continual reference, according to Baldwin, to similar knowing processes dealing with the same material and going on actually or possibly in other minds; it involves, in

[1] The entire work is appearing simultaneously in French, German and English. It includes a fair index to volumes one and two, and three appendices.

other words, community as a fundamental characteristic like quality, quantity, modality and relation. It also involves continual reference to the external control of the things, or spheres of things, that go to make up the knower's world. These constitute the great dualism of inner and outer controls which, according to Baldwin, is for the knower characteristic of the logical mode of cognition as distinct from the pre-logical and the super-logical modes.

New distinctions and problems inevitably give rise to a terminology sometimes strange. The reader of the book has difficulties to overcome, and not all of these are due to novel terms. An unusual number of faulty grammatical constructions and typographical errors, suggesting hasty writing and inadequate proof-reading, make one pause and ponder.

"The logical operations as such, considered as the essential method of progress or advance in the mode of thought, proceed by experimentation, or . . . schematism" (p. 4). But while schematism and experimentation are the essential method of advance in thought, judgment proper does not appear until they have been passed. Like Mill, Baldwin limits logical thought and judgment proper to the sphere of relations of implication. Judgment is the finished embodiment of belief. On the last page of the book the singular, the subject and the schematic are mentioned as extra-logical (p. 418). The general, the concrete and the logical are all retrospective, while schematism is always prospective. Contents are retrospective, intent and control are prospective.

Certain further fundamentals of the book may be grouped as follows: Two sorts of schematism, the recognitive or scientific and the selective or appreciative, are distinguished. Both are purposive, but the former alone must agree with facts and satisfy the theoretical or knowing interest. The latter is subject only to inner control, that is, the laws of reflection. Four kinds of interest are distinguished, namely, the "practical," the "pragmatic" (the practical interest considered from the outside or psychological point of view), the "theoretic" and the "pragmatelic" (interest in the system of knowledge as satisfying, fulfilling, consequential, etc.). The two types of schematism are named, in the pre-logical mode, presumption and lower assumption, and in the logical mode, presupposition and higher assumption. A child presumes the existence of a toy for which it cries; it assumes a control when it tries to "feed" its doll. We presuppose the law of conservation in physics: we assume a control in the "illusion of the theater." This is an adaptation of Meinong's distinction between *Annahme* and *Voraussetzung*.

The subject matter of judgment, here as with Brentano, is a single whole which usually presupposes a sphere of control within which the truth of the judgment falls. "Adam Bede was a noble fellow," presupposes a sphere called fiction, for example. The existential judgment merely makes the presupposed control predicative (but not attributal). In ordinary judgment there is a relational content under presuppositions: in the existential, the presupposition is asserted (or denied). Baldwin rejects Bradley's view that reality is the ultimate subject of logical judgment, "for reality is predicate, not subject" (p. 16, note 3). Then follows the distinction between reality-feeling and belief first presented in the author's "Handbook of Psychology." The former is a consciousness of intent rather than content; it is a reference to some presupposed field of control when no lack, doubt, disturbance or embarrassment exists as to the content present in reflection. Belief arises only after such disturbance has been resolved by judgment into positive assertion or denial. Belief embodies intent as well as content and its intent is presupposition. The latter has become so conventional in all social intercourse that the intent of belief is seldom stirred up (p. 23). "Belief is the disposition to judge or acknowledge a thing as in some sense existing or real."

Limitations of space preclude any attempt to reproduce the argument of the book here. The first chapter is the introduction, devoted to the nature and presuppositions of experimental logic. Chapter two classifies and discusses judgments or logical meanings accord-

ing to the sort and amount of belief they embody, following Venn to some extent. Chapter three deals with what we might call the social character of knowledge—all judgment as such is syndoxic, *i. e.*, its meanings are not only held in common, but held as common. The discussion distinguishes between those judgments actually held in common and those fit or appropriate to be held in common—catholic and synnomic syndoxity. Genetically the latter develops out of the former. The social aspect of knowledge, truth and reality is nowhere treated with the thoroughness and emphasis of this chapter. "The individual is not a social unit, he is a social outcome." "The private thought is not a cognitive unit, it is a cognitive outcome" (p. 105). And yet we have here an epistemology the main definitions and principles of which are molded by the presupposition that there is a plurality of minds face to face with a common but external world. That is, this is the knower's presupposition. One is apt to get the impression, however, that it is the author's—a presupposition which is very familiar to readers of eighteenth century philosophy. In the fourth chapter the problematical is defined as including the disjunctive and the contingent. The former has a definite control but expresses as yet indefinite internal relations in the content. The latter expresses definite internal relations of the content, but without a determined control. This chapter contains an interesting discussion of logical quantity. Chapter five deals especially with contingent meanings. The discussion of implication and postulation is here important. The development of logical meaning through predication and intercourse is taken up in chapter six. Chapter seven treats of the growth of logical meaning in terms. Elucidation and proposal, defined in chapter six, here appear as the "what" and the "why" of terms. Abstraction is discussed as selection based on individual dispositions and interests (p. 186). The author points out that the singular has, properly speaking, no extension. As prelogical it is purely appreciative. As logical, it is either "imported," *i. e.*, selective, or "essential" and imposed by external control. The distinction between the concrete and the abstract is only another illustration of the two-faced character of all logical meanings, a character of which the recognitive and the selective, the retrospective and the prospective, the implied and the proposed, the conventional and the experimental, the static and the dynamic, are other illustrations. In chapter eight, the proposition is defined as "that mode of predication in which relation is individuated as a meaning" (p. 211), but the relation is expressed, not in the copula, but in the predicate (p. 263). The characters of propositions enumerated are six—quantity, telling how much; control-wise community, telling by whom; content-wise community, telling for whom; quality, telling what; relational character, telling why, and modality, telling where or in what sphere it holds. The distinction between the content-wise and control-wise characters of propositions is not new except in name. It is the habitual and reconstructive aspects of judgments over again. This chapter (VIII.) is chiefly devoted to quality, and of the two, to the negative. The motive of negation is not rejection, as some have held, but further determination or individuation by limitation. Chapter nine deals with the import and character of propositions. All propositions are both analytic and synthetic, *i. e.*, they all elucidate and propose. All judgments, whether affirmative or negative, intend existence and are existential (p. 256). Disbelief is a form of belief. The true opposite of belief is doubt. There must be a certain categorical force in any proposition that expresses judgment. Two great characters of propositions are fundamental: the one dynamic, synthetic, developmental, the character of wholes as such; the other static, analytic, the character of relations established within wholes (p. 272). The former is named "modality," the latter, "relation."

Chapters ten, eleven and twelve, part three of this volume, are devoted to the second of these two great characters, *i. e.*, to the theory of implication or logical validity. Implication is the internal organization in which the achievements of successive judgments have issued. Its most general characteristic is

"reasonableness," and the two elements of reasonableness are identity-difference and control, validity and truth. "Every implication is a subject-matter identical with itself, different from or exclusive of any other and, taken together with its contradictory, exhaustive of the sphere of control in which they are both found" (p. 283). There is no *a priori* law or form of identity above and beyond the individuation of the object of thought as such. Identity is of two sorts, inner and outer, internal and external. The latter is resolvable into recurrence and "secondary conversion"; as to the former or inner identity "we wait neither for recurrence nor do we ask our neighbors. We find in the immediately persisting and continuous mental life the experience that enables us to call the self identical" (p. 289). The present reviewer does not believe this to be true or psychological. Self-identity in the subject of experience is no more an immediate intuition than the identity of the solar system is and we arrive at the consciousness of the one by precisely the same dialectic steps as the other. Perhaps Baldwin here means, however, that self-identity *seems to the knower* to come by immediate intuition, but even this statement seems to us to be a case of reading one's own prejudices into the experience of other people.

Class identity and singular identity differ only as a group of different objects with the same meaning differ from a group of recurrences of the same object with the same meaning, and from the standpoint of community these are the same thing.

Identity in difference is prelogical; it becomes identity and difference when taken up into the logical mode by judgment. This process is called induction and issues in classification, ordination and definition. Hence the two guiding threads of induction, says Baldwin, are agreement and difference, giving rise to the two fundamental methods recognized by Herschel and Mill. The other methods of Mill are variations on these two. Baldwin's discussion of induction is weak for the following reasons: Mill's methods are methods of discovering sequences, and not coexistences—an oversight that has characterized inductive logic ever since and one that characterizes this discussion. Again, they are methods of elimination and presuppose that nature is composed of manifold kinds and causal agents which have already been discovered and classified. These methods fail to describe the actual method of scientific procedure, because they assume that the objective content of judgment and the original data with which the judgment starts are one and the same thing.

Mill's methods are largely deductive rather than inductive, and the method by which Mill arrived at his canons of induction is deductive. They are deduced from an *a priori* conception of the objects of nature to be investigated. It will be evident, I think, that the method of induction outlined by Baldwin (pp. 304–7) is also deductive.

The resulting judgment is one of implication rather than one of proposal or schematism. The two great elements of validity are "universality of the necessary type" and the relation of dependence or ground. Such judgments are reached by establishing the synnomic force of judgments and the exhaustion of the class-meaning by limitation (p. 312). The former gives judgment its universality—its necessity—and the latter, its rational character as logical ground. The treatment of deduction is not only brief, it makes no attempt to show the intimate connection between deduction and experimentation in scientific procedure.

Chapters thirteen, fourteen and fifteen (part four of the book) are devoted to The Dualisms and Limitations of Thought. They are, for the most part, a discussion of pragmatism. They treat memory and thought as related alike to reality; each can be acted on because it is correct; it is false to say they are correct because they can be acted on. The criteria of correctness are conversion (or social control) and external control. Calling this view the theory of knowledge through control, Baldwin names the view of Dewey the theory of "control through knowledge." The latter is "the 'control' of the Studies in Logical Theory and other works of the Chicago school so-called." "It is control of a personal sort" (p. 349). Notwithstanding Baldwin's ex-

pressed hope (p. 349, note) that he has not misrepresented the doctrine of control of these writers, the present reviewer feels compelled to say he has misrepresented it by identifying it with his own doctrine of "inner" control!

The most characteristic feature of this volume, as of the previous one, is Baldwin's dualism of inner and outer controls. He holds, however, that the two controls exist only for the knower, "for consciousness" (p. 5, note), and only in the logical mode of thought. I suppose he intends to show that this dualism of controls is really phenomenal—in the third volume. Otherwise it is an important book and one that specialists in logical theory will welcome.

G. A. TAWNEY
UNIVERSITY OF CINCINNATI

BOTANICAL NOTES

DR. RUTH MARSHALL has given us an instructive pamphlet on the "Ferns of the Dells of the Wisconsin River," illustrated by halftone reproductions of photographs of the ferns themselves, and their rocky and often picturesque environment. A pleasantly and somewhat popularly written text adds to the interest of the pretty booklet.

FROM far-away Trinidad come three papers by J. B. Rorer on plant pathology—"Bud-rot of the Coconut Palm," "Black-rot and Canker of Cacao" and "A Bacterial Disease of Bananas and Plantains." The exact relationship of the organism in the latter case has not yet been made out.

DR. GROTH'S paper on the "Structure of Tomato Skins" in the Bulletin of the New Jersey Experiment Station (No. 228) will interest histologists as well as those who are studying the structural differences between closely related plants.

WILLIAM BEUTENMÜLLER'S recent contributions (*Bull. Am. Museum of Nat. Hist.*, vol. 28) on certain gall-producing insects is of interest to botanists as well as entomologists, since the galls themselves are strictly botanical. Excellent illustrations accompany the papers.

PROFESSOR PHILLIPS contributes materially to our knowledge of the life history of the junipers in his paper on "The Dissemination of Junipers by Birds" (*Forestry Quarterly*, vol. 8) in which he gives facts from which he reaches the conclusion that "birds are responsible for most of the dissemination of junipers," and that "mammals distribute only a small proportion of juniper seeds."

A PAPER on "Reforesting Operations" in the fifteenth Annual Report of the New York Forest, Fish and Game Commission, by E. R. Pettis, is full of helpful suggestions for all who are interested in this phase of the general subject of forestry. It is illustrated by many fine half-tone reproductions of photographs.

THE Report of the State Botanist (of the New York State Museum) for the year 1909, contains the usual lists of species not before reported (including no less than 38 flowering plants): some discussions of certain species; notes on certain species of edible fungi; new species from outside the state of New York; a monograph of New York species of *Inocybe*, and a similar treatment of the species of *Hebeloma*. Ten good colored plates accompany the report.

PROFESSOR C. E. LEWIS describes (Bull. Maine Expt. Station, No. 178) a new species of *Endomyces* (*E. mali*) which he discovered in a study of apple decay. Cultural and cytological comparisons are made with other species, and the paper is illustrated with drawings and half-tones of photographs.

IN another bulletin (No. 174) of the same station Professor W. J. Morse describes a stem and tuber disease of the potato which has assumed "rather grave aspects" and to which the name "blackleg" has been given. It is widespread in the United States from South Carolina to Maine, and westward to Colorado, and possibly further west, although often found only in isolated localities. It has not yet been determined whether or not the bacteria are identical with any hitherto described. It is probably spread by means of infected seed tubers.

ORMOND BUTLER'S "Observations on the California Vine Disease" (*Mem. Torr. Bot. Club*, XIV., 2) lead him to the conclusion that it "is due to some weakness in the functions of absorption and translocation of water

becoming manifest when conditions favoring transpiration are marked." The disease is therefore not due to the presence of parasitic organisms, but is what has been rather loosely called a physiological disorder.

In a short paper in the *Annales du Jardin Botanique de Buitenzorg* (2d Ser., Supp. III.) Professor Ramaley enumerates and discusses the European plants growing without cultivation in Colorado. In addition to an annotated list of species the author discusses the region included, and the mode of introduction and occurrence of the species. Botanists who have not given attention to these immigrants will be much surprised at the extent of the list.

Professor Sargent continues his studies of the species of hawthorns in Pennsylvania in a paper entitled "Crataegus in Pennsylvania, II.," published in the *Proceedings of the Academy of Natural Sciences of Philadelphia* (March, 1910). His first paper on the Pennsylvania hawthorns appeared about five years ago, since when much additional material has become available for study, resulting in a thick pamphlet of about one hundred pages. In this space the author enumerates and describes 110 species, of which 80 are described as new! Think of what the new editions of the botanical manuals will have to contain when these new species are added! We may have to grant the necessity of distinguishing these forms from one another in descriptive botany, but what an amount of work will have to be done by the taxonomists of the future in reducing these multitudinous forms to such categories as will be distinguishable by botanists, other than specialists in the hawthorns!

Charles E. Bessey
The University of Nebraska

SPECIAL ARTICLES

SEX LIMITED INHERITANCE IN DROSOPHILA

In a pedigree culture of *Drosophila* which had been running for nearly a year through a considerable number of generations, a male appeared with white eyes. The normal flies have brilliant red eyes.

The white-eyed male, bred to his red-eyed sisters, produced 1,237 red-eyed offspring, (F_1), and 3 white-eyed males. The occurrence of these three white-eyed males (F_1) (due evidentiy to further sporting) will, in the present communication, be ignored.

The F_1 hybrids, inbred, produced:

2,459 red-eyed females,
1,011 red-eyed males,
782 white-eyed males.

No white-eyed females appeared. The new character showed itself therefore to be sex limited in the sense that it was transmitted only to the grandsons. But that the character is not incompatible with femaleness is shown by the following experiment.

The white-eyed male (mutant) was later crossed with some of his daughters (F_1), and produced:

129 red-eyed females,
132 red-eyed males,
88 white-eyed females,
86 white-eyed males.

The results show that the new character, white eyes, can be carried over to the females by a suitable cross, and is in consequence in this sense not limited to one sex. It will be noted that the four classes of individuals occur in approximately equal numbers (25 per cent.).

An Hypothesis to Account for the Results.—The results just described can be accounted for by the following hypothesis. Assume that all of the spermatozoa of the white-eyed male carry the "factor" for white eyes "W"; that half of the spermatozoa carry a sex factor "X" the other half lack it, *i. e.*, the male is heterozygous for sex. Thus the symbol for the male is "WWX," and for his two kinds of spermatozoa WX—W.

Assume that all of the eggs of the red-eyed female carry the red-eyed "factor" R; and that all of the eggs (after reduction) carry one X, each, the symbol for the red-eyed female will be therefore RRXX and that for her eggs will be RX—RX.

When the white-eyed male (sport) is crossed with his red-eyed sisters, the following combinations result:

WX — W (male)
RX — RX (female)

RWXX (50 ♂) — RWX (50 ♂)
Red female — Red male

When these F_1 individuals are mated, the following table shows the expected combinations that result:

RX — WX (F_1 female)
RX — W (F_1 male)

RRXX — RWXX — RWX — WWX
(25 ♂) (25 ♂) (25 ♂) (25 ♂)
Red female — Red female — Red male — White male

It will be seen from the last formulæ that the outcome is Mendelian in the sense that there are three reds to one white. But it is also apparent that all of the whites are confined to the male sex.

It will also be noted that there are two classes of red females—one pure RRXX and one hybrid RWXX—but only one class of red males (RWX). This point will be taken up later. In order to obtain these results it is necessary to assume, as in the last scheme, that, when the two classes of the spermatozoa are formed in the F_1 red male (RWX), R and X go together—otherwise the results will not follow (with the symbolism here used). This all-important point can not be fully discussed in this communication.

The hypothesis just utilized to explain these results first obtained can be tested in several ways.

Verification of Hypothesis

First Verification.—If the symbol for the white male is WWX, and for the white female WWXX, the germ cells will be WX—W (male) and WX—WX (female), respectively. Mated, these individuals should give

WX — W (male)
WX — WX (female)

WWXX (50 ♀) — WWX (50 ♂)
White female — White male

All of the offspring should be white, and male and female in equal numbers; this in fact is the case.

Second Verification.—As stated, there should be two classes of females in the F_2 generation, namely, RRXX and RWXX. This can be tested by pairing individual females with white males. In the one instance (RRXX) all the offspring should be red—

RX — RX (female)
WX — W (male)

RWXX — RWX

and in the other instance (RWXX) there should be four classes of individuals in equal numbers, thus:

RX — WX (female)
WX — W (male)

RWXX — WWXX — RWX — WWX

Tests of the F_2 red females show in fact that these two classes exist.

Third Verification.—The red F_1 females should all be RWXX, and should give with any white male the four combinations last described. Such in fact is found to be the case.

Fourth Verification.—The red F_1 males (RWX) should also be heterozygous. Crossed with white females (WWXX) all the female offspring should be red-eyed, and all the male offspring white-eyed, thus:

RX — W (red male)
WX — WX (white female)

RWXX — WWX

Here again the anticipation was verified, for all of the females were red-eyed and all of the males were white-eyed.

Crossing the New Type with Wild Males and Females

A most surprising fact appeared when a white-eyed female was paired to a wild, red-eyed male, *i. e.*, to an individual of an unrelated stock. The anticipation was that wild males and females alike carry the factor for red eyes, but the experiments showed that all wild males are heterozygous for red eyes, and that all the wild females are homozygous. Thus when the white-eyed female is crossed with a wild red-eyed male, all of the female offspring are red-eyed, and all of the male offspring white-eyed. The results can be accounted for on the assumption that the wild male is RWX. Thus:

RX — W (red male)
WX — WX (white female)

RWXX (50 ♂) — WWX (50 ♂)

The converse cross between a white-eyed male RWX and a wild, red-eyed female shows that the wild female is homozygous both for X and for red eyes. Thus:

WX — W (white male)
RX — RX (red female)

RWXX (50 ♂) — RWX (50 ♂)

The results give, in fact, only red males and females in equal numbers.

General Conclusions

The most important consideration from these results is that in every point they furnish the converse evidence from that given by Abraxas as worked out by Punnett and Raynor. The two cases supplement each other in every way, and it is significant to note in this connection that in nature only females of the sport *Abraxas lacticolor* occur, while in *Drosophila* I have obtained only the male sport. Significant, too, is the fact that analysis of the result shows that the wild female *Abraxas grossulariata* is heterozygous for color and sex, while in *Drosophila* it is the male that is heterozygous for these two characters.

Since the wild males (RWX) are heterozygous for red eyes, and the female (RXRX) homozygous, it seems probable that the sport arose from a change in a single egg of such a sort that instead of being RX (after reduction) the red factor dropped out, so that RX became WX or simply OX. If this view is correct it follows that the mutation took place in the egg of a female from which a male was produced by combination with the sperm carrying no X, no R (or W in our formulæ). In other words, if the formula for the eggs of the normal female is RX—RX, then the formula for the particular egg that sported will be WX; *i. e.*, one R dropped out of the egg leaving it WX (or no R and one X), which may be written OX. This egg we assume was fertilized by a male-producing sperm. The formula for the two classes of spermatozoa is RX—O. The latter, O, is the male-producing sperm, which combining with the egg OX (see above) gives OOX (or WWX), which is the formula for the white-eyed male mutant.

The transfer of the new character (white eyes) to the female (by crossing a white-eyed male, OOX to a heterozygous female (F_1)) can therefore be expressed as follows:

OX — O (white male)
RX — OX (F_1 female)

RXOX—RXO — OOXX—OOX

Red female	Red male	White female	White male

It now becomes evident why we found it necessary to assume a coupling of R and X in one of the spermatozoa of the red-eyed F_1 hybrid (RXO). The fact is that this R and X are combined, and have never existed apart.

It has been assumed that the white-eyed mutant arose by a male-producing sperm (O) fertilizing an egg (OX) that had mutated. It may be asked what would have been the result if a female-producing sperm (RX) had fertilized this egg (OX)? Evidently a heterozygous female RXOX would arise, which, fertilized later by any normal male (RX—O) would produce in the next generation pure red females RRXX, red heterozygous females RXOX, red males RXO, and white males OOX (25 per cent.). As yet I have found no evidence that white-eyed sports occur in such numbers. Selective fertilization may be involved in the answer to this question.

T. H. Morgan

Woods Hole, Mass.,
July 7, 1910

Electrolytic Experiments Showing Increase in Permeability of the Egg to Ions at the Beginning of Development

It has been shown that at the beginning of development of the egg there is an increase in the absorption of oxygen (Warburg) and excretion of carbon dioxide (Lyon). This is evidently accompanied by increased oxidation within the egg, but varying views as to the cause of the increase have been advanced. The more rapid oxidation might be due to the

presence of oxidases within the egg or to an increase in the permeability of the egg to oxygen or carbon dioxide. The carbon dioxide might diffuse as ions or undissociated molecules, the oxygen only in the latter form. The lipoids of which the protoplasm is largely composed are relatively impermeable to ions.

With a view toward a decision between the above-mentioned views I studied the permeability of the egg of *Lytechinus* (*Toxopneustes*) *variegatus* to ions, at the Carnegie Laboratory at Tortugas, Fla. Since the ions alone carry the electric current through a solution, it was thought sufficient to measure the electric conductivity of the eggs (by the method of Kohlrausch).

The conductivity of the eggs was found to be very much lower than that of the sea water, and to be increased on fertilization or beginning of parthenogenesis. For example, in one experiment, the resistance (the reciprocal of the conductivity) of the sea water was 53 ohms, that of the unfertilized eggs 595 ohms and that of the same eggs after fertilization 455 ohms. In another experiment the resistance of the unfertilized eggs was 519 ohms and that of the same eggs made parthenogenetic with acetic acid 485 ohms.

During each set of experiments, the temperature (which was not far from that of the sea) did not vary one tenth of one degree. The amount of sea water mixed with the eggs was kept constant by removing all of the jelly-like coverings, centrifuging the eggs in the conductivity vessel, marking their upper level with a fine pen and indelible ink and centrifuging them down to the same level before every reading. The conductivity of the sperm and of the acetic acid solution was slightly less than sea water and each was thoroughly washed out with sea water. If the eggs, after having pushed out "fertilization" membranes, were centrifuged down to the former level, some of them were distorted, but this possible source of error was controlled by using eggs that had been washed so long in sea water that membranes were not pushed out in normal nor in parthenogenetic development. The current passed through the eggs was not sufficient to stimulate nerve.

The increased production of carbon dioxide was not sufficient to account for the increased conductivity, for the conductivity of the sea water was not measurably increased by saturating it with carbon dioxide.

The conductivity of the egg is much lower than that of an aqueous solution of its ash made up to the same volume. This may be due to the resistance of the surface layer, but is partly due to internal conditions as shown by placing the electrodes within the egg (hen's egg yolk). Experiments which I made at Cornell Medical College indicate that this low internal conductivity of the egg is due to the presence of poorly dissociated ion-proteid compounds (or adsorpates). The "yellow" yolk of the hen's egg consists of two non-miscible fluids and fine granules. The two fluids are both solutions containing lipoid-protein compounds and are not of sufficient difference in specific gravity to allow separation by the centrifuge. The granules are probably lecith-albumins and are precipitated by the centrifuge.

Hen's egg yolk was centrifuged and the top layer, containing very few granules, separated from the bottom layer, containing numerous granules. The following figures represent the elective conductivity (when divided by 100,000):

Layer	Undiluted	+ 1 vol. H_2O	+ 2 vols. H_2O	+ 3 vols. H_2O
Upper	302	268	162	96
Lower	278	278	200	125

The conductivity of the upper layer decreases with dilution, but a dilution of the lower layer with one volume of water does not decrease its conductivity. If this failure of dilution to decrease the conductivity were wholly due to the increase in the spaces between the granules (the fluid conducting and the granules insulating) the conductivity of the upper layer diluted with one volume of water would be greater than that of the lower layer at the same dilution, but the reverse being the case shows that the dilution must have caused the liberation of electrolytes from the granules.

The increase in electric conductivity of the egg at the beginning of development may be due to increased permeability to ions or to the liberation of ions from (physical or chemical) combination with proteids, but it is improbable that the latter occurs to any great extent, as no dilution of the egg contents (swelling of the egg) takes place.

We may conclude, then, that, at the beginning of development, the egg becomes more permeable to ions and thus the dissociated carbon dioxide is liberated. This decrease in an end product of oxidation in the egg allows an acceleration of oxidation and the consumption of oxygen. The decrease in oxygen leads to its increased absorption.

J. F. McClendon

Boca Grande Key, Fla.,
June 30, 1910

GEOLOGY AND GEOGRAPHY AT THE BOSTON-CAMBRIDGE MEETING

In accordance with the custom of the past few years, the officers of Section E did not ask for titles of any papers to be read at the Boston-Cambridge meeting, for the reason that the Geological Society of America, the Paleontological Society and the Association of American Geographers held meetings for the reading of papers. The meetings of these special societies occupied all the time from Tuesday morning, December 28, to Saturday night, January 1.

There were twelve titles of papers presented to Section E. These papers were read on Monday, December 27, in the University Museum, Cambridge, and were listened to by some fifty to seventy-five geologists and geographers. Between the morning and afternoon sessions many of those present enjoyed lunch at special tables in Memorial Hall.

SECTION E

The following officers for the Boston-Cambridge meeting were elected: member of council, Professor A. P. Brigham, and member of general committee, Dr. G. Otis Smith. The sectional offices were filled by the election of Dr. John M. Clarke, state geologist, Albany, N. Y., as vice-president for the ensuing year, and Dr. C. Willard Hayes, chief geologist of the U. S. Geological Survey, to serve as member of the sectional committee for five years. In accordance with a change in the constitution adopted at this meeting, the following become members *ex officio* of the sectional committee: Arnold Hague, president of the Geological Society of America; Dr. E. O. Hovey, secretary of the Geological Society of America; Professor H. C. Cowles, president of the Association of American Geographers, and Professor A. P. Brigham, secretary of the Association of American Geographers.

As retiring president of the Paleontological Society, Dr. John M. Clarke found it necessary to decline the honor of his selection as vice-president of Section E. The sectional committee of Section E have therefore nominated Professor Christopher W. Hall, professor of geology at the University of Minnesota, Minneapolis, to be the next vice-president.

The sectional committee of Section E is constituted as follows: retiring vice-president, Reginald W. Brock; vice-president, Christopher W. Hall; secretary, F. P. Gulliver; preceding secretary, E. O. Hovey; for one year, E. H. Barbour; for two years, J. B. Woodworth; for three years, F. B. Taylor; for four years, G. K. Gilbert; for five years, C. W. Hayes; president Geological Society of America, Arnold Hague; secretary Geological Society of America, E. O. Hovey; president Association of American Geographers, H. C. Cowles; secretary Association of American Geographers, A. P. Brigham.

VICE-PRESIDENTIAL ADDRESS

The retiring vice-presidential address of Mr. Bailey Willis on "Principles of Paleogeography" was given on Tuesday evening in the Geological Lecture Hall of the Massachusetts Institute of Technology at eight o'clock. This was published in Science, N. S., Vol. XXXI., p. 241.

HARVARD COLLEGE OBSERVATORY

Professor E. C. Pickering invited the geologists and geographers present at the meeting to visit the Harvard College Observatory in Cambridge on Monday afternoon from three to six. Professor E. C. Pickering and Professor W. H. Pickering met parties of geologists and geographers, numbering from ten to twenty, and turned them over to the various members of the scientific staff of the observatory. All portions of the observatory were open to inspection, and while some of the visitors spent most of their time in the study of the astronomical photographs, others were more interested in the study of variable stars, while still others cared more to see the methods of

observation with numerous telescopes, and all were given an opportunity to view the planets, Saturn, Venus and Mars; and variable, double and other stars.

Professor Pickering pointed out that many of the subjects with which astronomers have to deal are related to those of the geologists. He said that important results may be secured by cooperation, and there is reason to believe that a fund that could be used for geological work would be as valuable as it would be in astronomy. For example, a college professor in geology is often unable to carry on investigation for lack of the proper material needed for his work, for the lack of a trained assistant or for lack of the means of publication. He becomes absorbed in the duties of teaching, where a small sum given to him would enable him, in his leisure hours, to carry on work of the greatest importance. Great advances can be made in any science by using money in this way, giving it to scientific men who can work at home among their own surroundings much more advantageously than if they were taken to another city, in an institution devoted to such work.

Three methods of discovering variable stars were exhibited, *i. e.*, by means of their spectra, by means of a series of successive images taken the same night and by superposing a negative upon a positive of a negative taken on another night.

The field of work occupied by the observatory is a very broad one. It has occupied a station in Peru for the last twenty years to photograph the stars not visible in Europe or the United States. Last year it sent an observer to South Africa to see if the atmospheric conditions there would be better than they are in South America. The complete plan if carried out would involve securing a large tract of land in the place having the best climatic conditions, probably in South Africa, offering sites to any observatory that might wish to establish a station there. A large telescope should then be provided, and photographs taken with it which should be guarded as the property of the world and not of a single institution. These could be distributed among the astronomers who could make good use of them, and who would thus be provided with material, which they themselves could have obtained only by an expenditure of hundreds of thousands of dollars.

Various questions were asked Professor Pickering by his guests, which he declared himself unable to answer, saying that he considered his function the accumulating of facts, particularly those relating to the stars, which he hoped would thus furnish the material for the establishment of theories which might hereafter be advanced, those having special bearing on certain problems which have a connection with geology and astronomy, such as the formation of worlds, the distribution of the stars, and the existence of an absorbing medium in space.

RECEPTION GIVEN BY PROFESSOR JAGGAR

On Monday afternoon Professor T. A. Jaggar, Jr., invited the geologists and geographers to a reception at his home at Chestnut Hill. Owing to a snow storm of unusual depth for the region of Boston, transportation was very difficult, but with commendable zeal Professor Jaggar overcame the almost insurmountable difficulties caused by the heavy fall of snow, and those who reached his house enjoyed a most delightful afternoon and evening.

ABSTRACTS OF PAPERS READ BEFORE SECTION E

Some Physical Features in China: CHARLES K. EDMUNDS, Baltimore, Md. (Read by title.)

(*a*) Some recent views of the limestone pinnacles and palisades of the Fu River valley, Kwongsai.

(*b*) The locks of the Grand Canal between the Yangtze and the Yellow rivers, and their operation.

(*c*) A recent break in the Yellow River dyke, and its repair.

The views accompanying this paper were obtained during field work for the department of terrestrial magnetism, Carnegie Institution of Washington, during 1907 and 1908.

Structure, Origin and Stratigraphic Significance of the Shawangunk Grit: PAUL BILLINGSLEY, New York City.

The Shawangunk grit forms the ridge known in New York as the Shawangunk Mountains, in New Jersey as Kittatinny Mountain, and in Pennsylvania as Blue Mountain. This is a monoclinal ridge for the greater part of its length.

The Shawangunk grit rests unconformably upon the Martinsburg shales, and is separated from the overlying High Falls red shale by transition beds in the south, and a disconformity in the north. It varies from a coarse, poorly assorted conglomerate to a fine sandstone or even red shale. The details of its structure bedding, lithologic character and fossil content suggest a probability of its non-marine character, and point toward a torrential or alluvial-fan mode of origin.

Stratigraphically, the Shawangunk grit may be called early Salina in age. The red beds into which it grades upward indicate increasing aridity of climate, compatible with the suggested desert origin of the salt and gypsum deposits of this age in western New York and Michigan.

Microseisms: Otto Klotz, Ottawa, Canada.

It is found that disturbances are registered by the seismograph, which are not due to earthquakes. They have been noted in all parts of the world, and are more frequent in winter than in summer. They last sometimes for days with considerable regularity, presenting a "sawtooth" appearance, and have a period of about five seconds. They have been examined by the writer for the past three years, and he has found that they are essentially due to barometric pressure, more specifically to areas of low barometer with steep gradients. Furthermore, these areas of low barometer are most effective when they rest or pass over water, *i. e.*, the ocean. A corresponding area of low barometer even with steep gradients over land, approaching the earthquake station has little effect in producing microseisms. Wind affects the seismograph, but in a different manner. Wind effect as shown by microbarogram has its counterpart on the seismogram, but not as microseisms.

In Europe one should find, in conformity with the above deductions, microseisms recorded *before* the arrival of the low, as the storms travel from west to east; in eastern America passing from land to water, and in Europe from water to land.

High Terraces and Abandoned Valleys of Western Pennsylvania: E. Wesley Shaw, Washington, D. C. (Read by title.)

The features indicated by the above title are the well-known gravel-covered rock shelves found along the large streams of the region about 200 feet above present stream channels. They have been ascribed by different men to submergence and marine erosion; to a large ice dam at Cincinnati or Beaver; to normal stream work; and to huge local dams of ice. The data gathered by the present writer seem to indicate that the high terraces and abandoned channels developed as a unit through the overloading of the Allegheny in early glacial time and a later redissection. The aggradation of that stream caused every tributary to aggrade, and the coarseness, slope and other characters of the deposit indicate that the tributary streams built up as rapidly as the overloaded master stream. As the stream beds rose they reached the heights of one after another of the lowest places in divides between small tributaries, and at such times and places the currents of the rivers were divided and the cols occupied. When final redissection began the rivers chose the channels momentarily most desirable, and thus many parts of valleys were abandoned.

Glacio-lacustrine and Post-glacial Features of the Connecticut Valley near Hanover, N. H.: J. W. Goldthwait, Hanover, N. H.

The stratified drift deposits of the Connecticut Valley near Hanover, N. H., and the surface features developed on them by the sculpturing of tributaries to the Connecticut River furnish material which is of more than merely local interest.

An extensive clay plain, formed of thin-bedded silts of very uniform composition, is believed to be the heavily aggraded floor of an extinct lake of the Champlain stage, not a river deposit.

A delta of coarse gravel and sand, built by a small tributary stream at its debouchere into this lake, fixes its water level at 560 feet above the sea, or 30 to 60 feet above the clay plain.

There are features of post-glacial river erosion within the plain, including terraces, which are persistent up and down the valley, and are not due to local protection of ledges. There are intrenched tributary streams of various sizes, whose abandoned valley floors point clearly to temporary baselevels between the level of the Champlain Lake, 560 feet, and the Connecticut River, 375 feet. The chief of these are at 450 feet and 420 feet. Three working hypotheses for these stages are suggested: (*a*) rock barriers farther down the Connecticut Valley, which the master river has removed or swung off from; (*b*) tongues of ice or ice blocks which impounded the waters for a time, during the Champlain stage, and (*c*) postglacial regional upwarping which was not single and continuous, but consisted in a series of uplifts separated by pauses.

Large-scale contour maps made by students of the Thayer School of Civil Engineering furnish precise data for comparing the heights of terraces on different tributaries, up and down the valley.

The Shorelines of the Glacial Lakes in the Vermillion Quadrangle, Ohio: Frank Carney, Granville, Ohio. (Read by title.) No abstract received.

A Quantitative Measure of Maximum Arid Deflation: Charles R. Keyes, Des Moines, Iowa. (Read by title.)

In a normally moist land the volume of erosion

during any period is measurable from some upraised peneplain level; its depositional equivalent is usually much more difficult, and often impossible, to estimate.

When first recognized in its proper and vast proportions, erosion by the winds in desert regions appeared to have no downward limit corresponding to the baselevel of general stream-erosion. This aspect of the problem became the most serious obstacle to its solution. More recently a baselevel of eolic erosion has been found that is as sharply defined as normal peneplanation.

Inasmuch as general wasting of the land is measurable either by the amount of erosion or by the deposition products, but rarely by both at least in the same geographic province, later geologic time units are best estimated by the results of the erosional processes and the earlier time-intervals by sedimentation products.

In southwestern United States the products of the two opposed processes are in juxtaposition and are in a remarkable manner sharply contrasted. The character of the erosion is not, however, of the normal aqueous type, but of the eolic variety. It is particularly noteworthy at this time, on account of furnishing quantitative data on the extent and rate of eolic activities under climatic conditions stimulated solely by aridity.

This region of deserts has been already treated as a direct product of eolation without material interference from water action. The original surface at the initiation of the arid cycle is assumed to be essentially a peneplain extensively upraised. The main remnant of the latter is regarded as being the high Mesa de Maya in northeastern New Mexico. This level is also approximately the summit level of the majority of the Desert ranges. Below it the present plains level lies about 5,000 feet, the plains level being also about the same distance above sea level.

The depositional equivalent of the vast deflative work throughout the region appears to be best represented by the 5,000 to 8,000 feet of Tertiary boraciferous clays and sands occupying the Santa Clara, Mojave and Death basins of southern California, and by the thick, but as yet unmeasured, deposits of similar nature filling the great trough of the Californian gulf. These deposits are now believed to be mainly desert dusts blown into the adjoining shallow seas. Since they are subdivisible into Eocene, Miocene and Pliocene sections, as well as into several Quaternary terranes, quantitative data for the measurements of the several eolative phases of insolation, deflation and aeroposition are at once made available.

Destruction of the Drumlins in Boston Harbor: GEORGE C. CURTIS, Boston, Mass. (Read by title.)

The disappearance of the glacial islands of Boston harbor may be traced both by historical and by geological records. Transitions from the most perfect specimens of intact drumlin form through successive stages of wasting away, from mere nippings of their bases to last vanishing remnants of till, and further to outlining boulders as witnesses of former location, are exceptionally abundant in Boston Bay. Typical cases are selected from the harbor examples to illustrate the processes of marine erosion.

The Coral Island Bora Bora, and the Model as Illustrations of the Principles of Naturalistic Earth Relief: GEORGE C. CURTIS, Boston, Mass.

Bora Bora is a small island in the Society group, southwestern Polynesia. It is surrounded by a barrier reef of living corals. The island was early studied by Lesson, Darwin and Dana, and later by A. Agassiz. The writer made a detail survey and a series of deep-sea soundings a mile off the reef, about the entire island. The formations beginning with the deep sea, across the island shelf, barrier reef, reef flat, etc., to the central agglomerate peaks are taken up in order. Evidence of movements of elevation and depression are cited in this and other members of the Tahitian archipelago.

The model of the island, now installed in the coral room of the Agassiz Museum, for the construction of which the survey was primarily made, is considered as one of the pioneer works in this branch of geology, for the possible light it may be able to throw on the little-known principles of naturalistic earth relief.

The Geographic and Geologic Character of the "Sabana" about Caicara, Venezuela: T. A. BÉNDRAT, Turners Falls, Mass. No abstract received.

Report of the Third Meeting of the Permanent Commission of the International Seismological Association held at Zermatt, Switzerland, August 30 to September 3, 1909: OTTO KLOTZ, Ottawa, Canada. (Read by title.)

Résumé of meeting, with reference to several of the principal papers presented there.

The Glacial Recession in Western New England: F. B. TAYLOR, Fort Wayne, Ind.

During the retreat of the Labrador ice sheet

across western New England the configuration of the ice front, as expressed in horizontal plan, was greatly influenced by the topography. The Hudson and Champlain valleys are relatively deep, and are substantially continuous as one valley from the lowlands of the St. Lawrence on the north to the Atlantic Ocean on the south. This great trough is bounded by mountain ranges on both sides ten to twenty miles back from its axis. Into the north end of this trough the ice poured in a powerful stream, and the easy path of flow which it found along the valley axis led it there to push southward many miles beyond the points where it overtopped the two flanking mountain ranges. Thus in every stage of advance and retreat there was a great, sharply pointed ice lobe projecting one hundred miles or more south of the general line of the contemporary ice front on the adjacent higher ground.

The land around the headwaters of the Connecticut River is high, being a continuation of the Green Mountain range. On this account the ice sheet did not enter the Connecticut Valley until it had overtopped and flowed down the east side of the Green Mountain range. Thus, although the Connecticut Valley in Massachusetts is nearly as deep and wide as the Hudson Valley, it held no great ice lobe. The ice came into the Connecticut Valley over the Green Mountain range from the northwest, and the whole region between the two rivers was domineered by the ice of the Hudson lobe.

Detailed studies in the Housatonic and Taconic quadrangles have disclosed the presence of no large or continuous terminal morainic deposits, but instead many small, scattered fragments in the valleys. These mark the places of the termination of small ice tongues, which crept forward a few miles into the valleys from the front of the main ice mass. Each such deposit marks a halting place in the retreat of the ice. By following the series of these morainic fragments through parallel and interlacing valleys a method of correlation was found by which it was possible to reconstruct the successive positions of the ice border. It was thus found that the general trend of the ice border in retreating across Berkshire County and adjacent areas was from northeast to southwest, and the general direction of ice movement was about south 40° east. This general trend marks the eastern limb of the Hudson Valley ice lobe, but the mountainous character of the region and the plastic adaptation of the ice to the topography caused the formation of many sharp little ice tongues with equally sharp reentrant angles between them. Thus, at each halt, the border of the ice was intensely serrate. The slope of the small ice tongues varied from 100 to 120 feet per mile in some cases. The rate of rise along the general front, ignoring the smaller tongues, was something like 30 feet to the mile. In most of this region the successive halts are spaced by intervals of 3½ to 4 miles.

On account of the obstruction of natural drainage by the ice mass many small temporary glacial lakes were formed. One of the largest was Lake Housatonic, a sprawling, irregular lake, lying mainly between Lee and Glendale. One of the largest lakes of New England, however, occupied the valley of the Hoosic River, and is known as Lake Bascom. From first to last this lake was 25 or 30 miles long, and at Williamstown it was 500 feet deep. Numerous deltas were formed in it by mountain streams, and mark different levels of its waters. Outlets or points of overflow from this lake are well marked at several places and at different levels.

Glacial erosion in this region was in general very slight, and is conspicuous only on mountain tops and lesser saliences. Nothing was found suggesting over-deepening by ice action. The whole area is covered with immense numbers of bowlders, but few were found that could be attributed to a source more than twenty miles back on the line of ice movement, and none that are traceable to the Adirondacks or any other point west of the Hudson.

Studies in the Ware and Quinsigamond quadrangles in central Massachusetts by W. C. Alden show fragmentary moraines of similar character, distribution and spacing, and seem to indicate a close resemblance in the manner of glacial retreat.

On Friday evening the Association of American Geographers met informally in Technology Union for a round table conference on the topic "The Organic Side of Geography, its Nature and Limits." The conference was led by Professor Albert Perry Brigham.

Owing to the illness of several of those concerned with the preparation of this manuscript the account of geology and geography at the Boston-Cambridge meeting has been delayed until this late date. The secretary makes his humble apologies to the geologists and geographers, and hopes that although delayed this account will be of interest to many.

F. P. Gulliver,
Secretary Section E